WHAT IS CLAIMED IS:

1. A laser, comprising:

an optically resonant cavity defined by two or more reflecting surfaces;

a substantially <100>-oriented crystal disposed within the cavity, wherein the crystal is characterized by a crystal orientation such that a <100> plane of the crystal is oriented substantially perpendicular with respect to a direction of propagation of a beam of stimulated radiation within the crystal; and

a pump source configured to provide pumping energy to a pumped region of the crystal, wherein an absorbed pump power of the pumping energy is less than about 1000 watts and/or a cross-sectional overlap between a beam of radiation propagating through the crystal and the pumped region is greater than about 20% of a cross-sectional area of the pumped region,

wherein the use of the substantially <100>-oriented crystal reduces depolarization loss or thermal lensing compared to a substantially similarly configured gain medium made from the same material as the substantially <100>-oriented crystal but having instead a substantially non-<100>-orientation.

2. The laser of claim 1 wherein a diameter of a beam of radiation propagating through the crystal is greater than about 45% of a diameter of the crystal.

3. The laser of claim 1 wherein the crystal is not naturally birefringent.

4. The laser of claim 1 wherein the crystal has a simple cubic structure.

5. The laser of claim 1 wherein the crystal is selected from the group of yttrium aluminum garnet (YAG) and gadolinium scandium gallium garnet (GSGG).

6. The laser of claim 1, wherein the crystal is yttrium aluminum garnet (YAG).

7. The laser of claim 1 wherein the crystal is Tm:Ho:YAG, Yb:YAG, Nd:YAG or Er:YAG.

8. The laser of claim 1 wherein the crystal is Nd:YAG.

9. The laser of claim 1 wherein the pump source is configured to provide the pumping energy through a side of the crystal that is oriented substantially parallel to the direction of propagation.

10. The laser of claim 9 wherein the crystal is disposed within a pump cavity configured to reflect the pumping energy back into the crystal.

11. The laser of claim 10, further comprising one or more beam-shaping elements configured to provide the beam of stimulated radiation with a substantially elliptical cross-section within the crystal.

12. The laser of claim 1 further comprising first and second non-linear elements configured such that the laser is a frequency tripled laser.

13. The laser of claim 12, wherein the first and second non-linear elements are disposed within the cavity, whereby the laser is an intracavity frequency-tripled laser.

14. The laser of claim 1, wherein the crystal gain medium is oriented such that the polarization of the stimulated radiation is directed substantially along a diagonal between two crystal axes other than the <100> axis.

15. A method for reducing depolarization loss or thermal lensing, in a gain medium in a laser or optical amplifier, the method comprising:

using as the gain medium, a crystal characterized by a crystalline orientation such that a <100> plane of the crystal is oriented substantially perpendicular with respect to a direction of beam propagation within the crystal; and

providing pumping energy to a pumping region of the crystal,

wherein an absorbed pump power of the pumping energy is less than about 1000 watts and/or a cross-sectional overlap between a beam of radiation propagating through the crystal and the pumped region is greater than about 20% of a cross-sectional area of the pumped region,

wherein the use of the substantially <100>-oriented crystal reduces depolarization loss or thermal lensing compared to a substantially similarly configured gain medium made from the same material as the substantially <100>-oriented crystal but having instead a substantially non-<100>-orientation.

16. The method of claim 15 wherein a diameter of a beam propagating through the crystal is greater than about 45% of a diameter of the crystal.

17. The method of claim 15 wherein the crystal is a fluoride crystal or an oxide crystal.

18. The method of claim 15 wherein the crystal is not naturally birefringent.

19. The method of claim 15 wherein the crystal is selected from the group of yttrium aluminum garnet (YAG) and gadolinium scandium gallium garnet (GSGG).

20. The method of claim 15, wherein the crystal is yttrium aluminum garnet (YAG).

21. The method of claim 15 wherein the crystal is Tm:Ho:YAG, Yb:YAG, Nd:YAG or Er:YAG.

22. The method of claim 15 wherein the crystal has a simple cubic structure.

23. The method of claim 15 wherein the crystal is disposed within an optical cavity of a laser.

24. The method of claim 15 wherein providing energy to the pumping region of the crystal includes side-pumping the crystal.

25. The method of claim 15 wherein the crystal gain medium is oriented such that the polarization of the stimulated radiation is directed substantially along a diagonal between two crystal axes other than the <100> axis.

26. The use in a laser or optical amplifier as a gain medium of a crystal characterized by an orientation such that a <100> plane of the crystal is oriented substantially perpendicular with respect to a direction of beam propagation within the crystal, wherein the crystal absorbs a power less than or equal to about 1000 watts of pumping energy and/or a cross-sectional overlap between a beam of radiation propagating through the crystal and a pumped region of the crystal, is greater than about 20% of a cross-sectional area of the pumped region of the crystal,
wherein the use of the substantially <100>-oriented crystal reduces depolarization loss or thermal lensing compared to a substantially similarly configured gain medium made from the same material as the substantially <100>-oriented crystal but having instead a substantially non-<100>-orientation.

27. The use of claim 26 wherein a diameter of a beam propagating through the crystal is greater than about 45% of a diameter of the pumped region of the crystal.

28. The use of claim 26 wherein the crystal is not naturally birefringent.

29. The use of claim 26 wherein the crystal has a simple cubic structure.

30. The use of claim 26 wherein the crystal is selected from the group of yttrium aluminum garnet (YAG) and gadolinium scandium gallium garnet (GSGG).

31. The use of claim 26, wherein the crystal is yttrium aluminum garnet (YAG).

32. The use of claim 26 wherein the crystal is Tm:Ho:YAG, Yb:YAG, Nd:YAG or Er:YAG.

33. The use of claim 26 wherein the crystal is Nd:YAG.

34. The use of claim 26 wherein the pumping energy is provided to the pumped region by side-pumping the crystal.

35. The use of claim 26 wherein the crystal gain medium is oriented such that the polarization of the stimulated radiation is directed substantially along a diagonal between two crystal axes other than the <100> axis.

36. An optical amplifier, comprising a gain medium in the form of a crystal characterized by an orientation such that a <100> plane of the crystal is oriented substantially perpendicular with respect to a direction of beam propagation within the crystal, wherein the crystal absorbs a power less than or equal to about 1000 watts of pumping radiation and/or a cross-sectional overlap between a beam of radiation propagating through the crystal and a pumped region of the crystal, is greater than about 20% of a cross-sectional area of the pumped region of the crystal,
wherein the use of the substantially <100>-oriented crystal reduces depolarization loss or thermal lensing compared to a substantially similarly configured gain medium made from the same material as the substantially <100>-oriented crystal but having instead a substantially non-<100>-orientation.